NOTICES OF PUBLIC INFORMATION

Notices of Public Information contain corrections that agencies wish to make to their notices of rulemaking; miscellaneous rulemaking information that does not fit into any other category of notice; and other types of information required by statute to be published in the *Register*. Because of the variety of material that is contained in a Notice of Public Information, the Office of the Secretary of State has not established a specific format for these notices.

NOTICE OF PUBLIC INFORMATION

DEPARTMENT OF ENVIRONMENTAL QUALITY

[M05-112]

1. **A.R.S. Title and its heading:** 49, The Environment
A.R.S. Chapter and its heading: 2, Water Quality Control
A.R.S. Article and its heading: 2.1, Total Maximum Daily Loads
Section: A.R.S. § 49-234, Total maximum daily loads; implementation plans

2. **The public information relating to the listed statute:**

Pursuant to A.R.S. § 49-234, ADEQ is required to develop a total maximum daily load (TMDL) for navigable waters that are listed as impaired. The purpose of this notice is to publish the Department's determinations of total pollutant loadings for TMDLs in the French Gulch Watershed and in the Tonto Creek Watershed that the Department intends to submit to the Regional Administrator for Region 9, U.S. Environmental Protection Agency ("EPA") for approval.

The Department previously provided public notice and an opportunity for public comment on the draft "French Gulch TMDLs for Cadmium, Copper, and Zinc" in *The Daily Courier*, a newspaper of general circulation in the affected area, on March 18, 2005. The Department did not receive written comments on the draft TMDL within or outside of the 30-day public comment period. The Department also previously provided public notice and an opportunity for public comment on the draft "Proposal of a Total Maximum Daily Load For: Tonto Creek (Headwaters to Hailger Creek), Parameter: Total Nitrogen," in *The Payson Roundup & Advisor*, a newspaper of general circulation in the affected area, on February 17, 2005 and again on March 17, 2005 after the draft was updated to include additional information from the State of Arizona Game and Fish Department (AZG&F). The Department received written comments from the AZG&F during the first 30-day comment period. No comments were received during or outside of the second 30-day comment period. The purpose of this notice is to satisfy A.R.S. §§ 49-234(D) and 49-234(E), which require the Department to publish in the *Arizona Administrative Register* the determination of total pollutant loadings that will not result in impairment and the proposed allocations among the contributing sources that are sufficient to achieve the total pollutant loadings.

3. **TMDLs**

A. TMDL Process

A TMDL represents the total load of a pollutant that can be assimilated by a waterbody on a daily basis and still meet the applicable water quality standard. The TMDL can be expressed as the total mass or quantity of a pollutant that can enter the waterbody within a unit of time. In most cases, the TMDL determines the allowable pounds per day of a pollutant and divides it among the various contributors in the watershed as wasteload (i.e., point source discharge) and load (i.e., nonpoint source) allocations. The TMDL must also account for natural background sources and provide a margin of safety. For nonpoint sources such as accelerated erosion or internal nutrient cycling, it may not be feasible or useful to derive a figure in terms of pounds per day. In such cases, a percent reduction in pollutant loading may be proposed. A load analysis may take the form of a phased TMDL, if source reduction or remediation can be better accomplished through an iterative approach.

In Arizona, as in other states, changes in standards or the establishment of site-specific standards are the result of ongoing science-based investigations or changes in toxicity criteria from EPA. Changes in designated uses and standards are part of the surface water standards triennial review process and are subject to public review. Standards are not changed simply to bring the waterbody into compliance, but are based on sound science that includes evaluation of the risk of impact to humans or aquatic and wildlife. Existing uses of the waterbody and natural conditions are considered when standards for specific water segments are established.

These TMDLs meet or exceed the following EPA Region 9 criteria for approval:

Plan to meet State Surface Water Quality Standards: The TMDLs include a study and a plan for the specific pollutants that must be addressed to ensure that applicable water quality standards are attained.

Describe quantified water quality goals, targets, or endpoints: The TMDL must establish numeric endpoints for the water quality standards, including beneficial uses to be protected, as a result of implementing the TMDLs. This often requires an interpretation that clearly describes the linkage(s) between factors impacting water quality standards.

Analyze/account for all sources of pollutants: All significant pollutant sources are described, including the magnitude and location of sources.

Identify pollution reduction goals: The TMDL plan includes pollutant reduction targets for all point and nonpoint sources of pollution.

Describe the linkage between water quality endpoints and pollutants of concern: The TMDLs must explain the relationship between the numeric targets and the pollutants of concern. That is, do the recommended pollutant load allocations exceed the loading capacity of the receiving water?

Develop margin of safety that considers uncertainties, seasonal variations, and critical conditions: The TMDLs must describe how any uncertainties regarding the ability of the plan to meet water quality standards have been addressed. The plan must consider these issues in its recommended pollution reduction targets.

Provide implementation recommendations for pollutant reduction actions and a monitoring plan: The TMDLs should provide a specific process and schedule for achieving pollutant reduction targets. A monitoring plan should also be included, especially where management actions will be phased in over time and to assess the validity of the pollutant reduction goals.

Include an appropriate level of public involvement in the TMDL process: This is usually met by publishing public notice of the TMDLs in a newspaper of general circulation in the area affected by the study, circulating the TMDLs for public comment, and holding public meetings in local communities. Public involvement must be documented in the state's TMDL submittal to EPA Region 9.

In addition, these TMDLs comply with the public notification requirements of A.R.S. Title 49, Chapter 2, Article 2.1: Publication of these TMDLs in the *Arizona Administrative Register* is required per Arizona Revised Statute, Title 49, Chapter 2, Article 2.1 prior to submission of the TMDL to EPA. The Department shall:

1. Prepare a draft estimate of the total amount of each pollutant that causes impairment from all sources that may be added to a navigable water while still allowing the navigable water to achieve and maintain applicable surface water quality standards, and provide public notice and an opportunity for comment in a newspaper of general circulation in the affected area;
2. Publish a notice in the *Arizona Administrative Register* (this notice) of the determination of total pollutant loadings that will not result in impairment, a summary of comments received to the initial TMDL public notice, and the Department's responses to the comments;
3. Make reasonable and equitable allocations among TMDL sources, and provide public notice and an opportunity for comment in a newspaper of general circulation in the affected area;
4. Publish a notice in the *Arizona Administrative Register* (this notice) of the allocations among contributing sources, along with responses to any comments received on the draft allocations in a newspaper of general circulation.

Federal law only requires the submittal of the pollutant loadings to EPA for approval. However, the Department considers the pollutant loadings and the draft allocations to be integrally related and should be presented together to afford the public a complete understanding of the issues, outcomes and recommendations of the TMDL analysis. For that reason, the Department has combined the loadings and allocations in both the public notice in the local newspaper as well as in this publication in the *Arizona Administrative Register*.

B. TMDL for French Gulch

INTRODUCTION

French Gulch, a tributary to the Hassayampa River in the Middle Gila Basin between the towns of Prescott and Wickenburg, rises in the Weaver Mountains near Kirkland Junction in Yavapai County. French Gulch first appeared on ADEQ's list of water quality limited waters (303(d) List) in 1994. The French Gulch TMDL investigation commenced in 2001 in response to the 1998 listing which showed exceedances of cadmium, copper, manganese, pH, and zinc surface water quality standards. This TMDL investigation assesses the loading of French Gulch from its headwaters to its confluence with the Hassayampa River.

Currently, French Gulch is listed for exceedances of cadmium, copper, and zinc. Sampling in support of source and critical condition identification was slowed because of drought conditions, thus this project has spanned several assessments.

For this TMDL investigation, samples were collected to support identification of sources of pollutant loading; to support identification of critical conditions for loading; and to calculate pollutant loads and allocations for the identified load sources. Sources of pollutant loading for French Gulch include only nonpoint source contributions from springs, inactive and abandoned mine workings, in-stream precipitates, ranching, and background. The metals, cadmium, copper, and zinc increase in French Gulch within the Zonia mine area with metal transport declining downstream in the Placerita Gulch area. This investigation results in TMDLs for three distinct areas: the headwaters of French Gulch, the Zonia mine area, and the Placerita Gulch area.

WATERSHED OVERVIEW

Waterbody:	French Gulch Watershed
Drainage:	16 square miles
Designated Uses:	Aquatic & Wildlife, warm water (acute & chronic); Fish consumption; Full body contact
Communities:	Wagner, Wilhoit
County:	Yavapai
Land Ownership:	BLM, Private, State trust
Land Use:	Ranching, Mining
Principal Geology:	Pre-Cambrian to Tertiary igneous and metamorphic rocks
Potential Sources:	Inactive mine site

LOADS, TMDLs, AND ALLOCATIONS

The estimated loadings at the four regions in the watershed (regional loading analysis) included: the headwaters of French Gulch, below the Zonia Mine including subwatersheds contributing to the regional outlet, below Placerita Gulch including subwatersheds contributing to the regional outlet, and all subwatersheds contributing to the outlet of French Gulch. Subwatersheds were delineated for the French Gulch watershed based on the location of water quality and flow sampling points and critical sources, stream connectivity, and available Digital Elevation Model data. The French Gulch Watershed was divided into 26 subwatersheds for hydrologic simulation. These subwatersheds were used to simulate hydrologic processes for smaller regions of the watershed.

In order to develop TMDLs for the French Gulch watershed, a loading analysis was performed using the results of the LSPC hydrologic modeling. Two approaches were used to generate TMDLs. One approach presents a loading analysis by pollutant for the four major regions in the watershed. The other approach presents the loading analysis by pollutant for all the subwatersheds with available monitoring data (subwatershed loading analysis). (Tetra Tech, 2004)

Existing Loads and Load Capacity

Load duration curves and loading tables were generated by Tetra Tech for each of the four regions and for each subwatershed. With each of the regional curves, they included a summary table with the recurrence interval (percentile), allowable load, existing load, % reduction, TMDL, LA, and MOS. With each of the subwatershed curves, they included % reduction, existing load, TMDL, LA, and MOS when exceedances were found. The "Interval" column shows the flow percentile based on the model flow results starting from the 0.015 to the 90th percentile of flow. (Results for each 10th percentile have been displayed as well as the 100 year frequency rainfall event and the two year frequency rainfall event. The first two rows in the column are the percentile under the 100 year frequency rainfall event (0.015) and the two year frequency (0.120-0.150) rainfall event (the bankfull condition in French Gulch). These rainfall events are identified based on NOAA's point precipitation frequency estimate for the Wilhoit gage. According to this data, the 100 year frequency rainfall for 24 hour will be 4.56 (in), which is similar to the 4.21 (in) rainfall observed on 9/26/1997 from ADEQ precipitation data. The other extreme condition, the two-year frequency rainfall for 24 hours will be 2.07 (in) from the NOAA data. This rainfall amount is similar to 2.05 (in) rainfall observed on 9/23/1993 from the ADEQ precipitation data. (Tetra Tech, 2004)

The "Existing" column presents loadings based on a trend line developed to create a continuum of existing loads with the available highest concentration of monitoring data (when there was more than one sample within an event at a specific site). The highest concentration was selected to protect water quality criteria under the most stringent conditions. The trend line was created where there were sufficient observations (i.e., more than 3 observation points) data were available. (Tetra Tech, 2004)

The "Allowable" column presents loads for the water quality criteria over specified flow percentiles from the "Interval" column. This "Allowable" column was calculated using the lowest available hardness value (to be conservative) based on the observed data at each location. Hardness values less than 25 were set at 25 and hardness values greater than 400 were set at 400, consistent with the State of Arizona's Surface Water Quality Standards. (Tetra Tech, 2004)

The allowable load or load capacity was determined by multiplying the most stringent water quality criteria for each parameter, the A&Ww-chronic, by flow, by a unit conversion factor. To meet water quality standards, the TMDL cannot be set higher than the load capacity (allowable load). The French Gulch TMDLs have been set at the load capacity. Considering the TMDL equation,

$$TMDL = \Sigma WLA + \Sigma LA + MOS,$$

this means the WLAs, LAs, and MOS must be subtracted from the (load capacity) TMDL.

Where the two values described above, "allowable" and "existing" values are available, required load reductions can be presented for all flow conditions (as well as the flow regimes of interest to ADEQ – extremely high, bankfull, and baseflow). However, in situations where no existing data are available to develop existing loads, these reductions cannot be identified, and only the water quality criteria loads can be presented. For the regions where reduction percentages are not specified using this regional loading analysis, the subwatershed loading analysis, should be referred to as alternate TMDLs for these regions where the contributing subwatersheds require reductions. (Tetra Tech, 2004) (Table 1)

Table 1. Loading Areas for French Gulch TMDL Calculations

Parameter	Region	TMDL Calculations based on results from:
Cadmium	Region 1	Subwatershed 26
	Region 2	Region 2
	Region 3	Subwatershed 13
	Region 4	Subwatershed 1, insufficient data for TMDL calculation
Copper	Region 1	Subwatershed 26
	Region 2	Region 2
	Region 3	Region 3
	Region 4	Subwatershed 1, insufficient data for TMDL calculation
Zinc	Region 1	Subwatershed 26
	Region 2	Region 2
	Region 3	Region 3
	Region 4	Subwatershed 1, insufficient data for TMDL calculation

Load Allocations

With no allowance for WLA, the TMDL equation for French Gulch becomes

$$TMDL = \Sigma LA + 20\% (TMDL).$$

Because the TMDL has been set to equal the load capacity, this results in $80\% TMDL = \Sigma LA$.

Wasteload Allocations

There are no AZPDES permitted point sources in the watershed; therefore, no waste load allocations (WLAs) were made for French Gulch. The WLA is zero.

Margin of Safety

The French Gulch TMDLs have been calculated using an explicit 20% MOS. Because the Arizona Department of Health Services Laboratory has confirmed the precision of measurement of the parameters of concern is plus or minus 5%, an explicit MOS of 5% was applied to account for this error. The other 15% was applied to account for field conditions and decisions made during modeling. The field conditions include sampling during drought conditions and the use of the grab sample collection method. The decisions made during modeling include,

- the combination and application of meteorologic information from the French Gulch watershed and the Wilhoit gage station;
- the computation of hourly evapotranspiration;
- use of a surface water flow model to model a system complicated by groundwater inputs;

- a decision not to explicitly model the Southwest Holding Pond nor French Gulch Diverted;
- the use of estimated well operation records;
- subsurface geology estimations, i.e. non-leaky, homogeneous aquifer; and,
- a dynamic model simulating daily flows over a wide range of hydrologic conditions, and simulating dissolved metal concentrations (Tetra Tech, 2004c).

A non-quantifiable implicit MOS was also applied through numerous ways including,

- deriving TMDLs for discrete and logical subsections of the French Gulch watershed in lieu of calculating one set of TMDLs for the end of the listed reach;
- setting the TMDLs so that the most stringent water quality criteria will be met; and
- the use of conservative assumptions made during modeling (i.e., using the highest concentration data when there was more than one sample at a specific site for the same event; using the lowest available hardness value to calculate allowable load).

In summary, a 20% explicit MOS was used to account for the dynamic model simulating daily flows over a wide range of hydrologic conditions, and simulating metals dissolved concentrations. (Tetra Tech, 2004) The use of conservative assumptions during modeling and TMDL calculation provided for an implicit MOS.

French Gulch TMDLs

TMDLs identify the total amount of pollutant that can be assimilated by the receiving system while still achieving water quality standards. The pollutants requiring TMDLs for French Gulch are cadmium, copper, and zinc. Table 2 lists the interval, flow, existing loads, allowable loads (load capacity), TMDL, MOS, WLA, LA, and %-reduction for each pollutant within the French Gulch watershed where a load reduction is necessary.

As previously stated, load duration curves were developed for each of the four regions and each of the subwatersheds. The model estimated loads for flows up to and including the 100-yr return interval. Results for each 10th percentile flow, the bankfull flow (0.12 – 0.15), and the 100-year rainfall event (0.015) were presented. Because of the infrequency of flows above bankfull, the 0.015 event was not used for TMDL calculation.

Reviewing the necessary reductions, it is apparent that loading in French Gulch is not linear. As an example, cadmium loading in Region 2 requires no reduction at the 90th percentile flow, a 51.40% reduction at the 80th percentile flow, 17.46% reduction at the 60th percentile flow, a 45.76% reduction at the 20th percentile flow, and no reduction at the 0.15 percentile flow. Because the TMDLs must protect French Gulch from exceedances of water quality standards at all flows and because loading fluctuates with flow in a non-linear manner, a decision was made to present TMDLs for each interval where a load reduction is necessary. Flows that fall between two of the modeled intervals will need to meet the TMDL and allocations assigned to the next higher (more frequent) flow interval; i.e., in Region 2, cadmium loads for flows between the 80th and 70th percentiles will need to meet the TMDL and allocations assigned to the 80th percentile.

Table 2. French Gulch Loads, TMDLS, and Allocations

Parameter	Loading Area	Interval (percentile)	Flow (cfs)	Existing (mg/day)	Load Capacity is equal to TMDL (mg/day)	MOS (mg/day)	WLA (mg/day)	LA (mg/day)	% reduction
Cd	**Region 2**	10	1.18E-01	6.81E+02	4.92E+02	9.84E+01	0	3.94E+02	42.14%
		20	4.41E-02	2.71E+02	1.84E+02	3.67E+01	0	1.47E+02	45.76%
		30	2.84E-02	1.58E+02	1.18E+02	2.36E+01	0	9.44E+01	40.25%
		40	2.20E-02	1.08E+02	9.17E+01	1.83E+01	0	7.33E+01	32.13%
		50	1.87E-02	8.02E+01	7.77E+01	1.55E+01	0	6.21E+01	22.57%
		60	1.56E-02	6.30E+01	6.50E+01	1.30E+01	0	5.20E+01	17.46%
		70	1.09E-02	5.13E+01	4.53E+01	9.05E+00	0	3.62E+01	29.43%
		80	6.27E-03	4.30E+01	2.61E+01	5.21E+00	0	2.09E+01	51.40%

	Region 1	0.12	1.50E+01	6.49E+04	1.94E+04	3.88E+04	0	1.55E+05	76.09%
		0.15	5.74E+01	7.35E+07	9.16E+05	1.83E+05	0	7.33E+05	99.00%
		10	1.18E-01	2.52E+04	1.89E+03	3.77E+02	0	1.51E+03	94.01%
		20	4.41E-02	6.76E+03	7.04E+02	1.41E+02	0	5.63E+02	91.67%
		30	2.84E-02	3.13E+03	4.53E+02	9.05E+01	0	3.62E+02	88.43%
		40	2.20E-02	1.81E+03	3.52E+02	7.03E+01	0	2.81E+02	84.48%
		50	1.87E-02	1.19E+03	2.98E+02	5.96E+01	0	2.38E+02	80.00%
		60	1.56E-02	8.38E+02	2.49E+02	4.99E+01	0	1.99E+02	76.25%
		70	1.09E-02	6.26E+02	1.74E+02	3.47E+01	0	1.39E+02	77.80%
	Region 2	80	6.27E-03	4.85E+02	1.00E+02	2.00E+01	0	8.00E+01	83.51%
		0.135	1.62E+02	7.11E+07	1.16E+07	2.31E+06	0	9.26E+06	86.98%
		10	2.50E-01	3.29E+04	1.79E+04	3.58E+03	0	1.43E+04	56.53%
Cu	**Region 3**	20	1.16E-01	9.57E+03	8.30E+03	1.66E+03	0	6.64E+03	30.62%
	Region 1	0.12	1.50E+01	9.22E+05	8.16E+05	1.63E+05	0	6.53E+05	29.18%
		0.15	5.74E+01	4.48E+07	1.20E+07	2.39E+06	0	9.57E+06	78.64%
		10	1.18E-01	1.13E+05	2.47E+04	4.94E+03	0	1.98E+04	82.48%
		20	4.41E-02	4.20E+04	9.22E+03	1.84E+03	0	7.37E+03	82.45%
		30	2.84E-02	2.35E+04	5.94E+03	1.19E+03	0	4.75E+03	79.79%
		40	2.20E-02	1.56E+04	4.61E+03	9.22E+02	0	3.69E+03	76.35%
		50	1.87E-02	1.14E+04	3.91E+03	7.81E+02	0	3.12E+03	72.63%
		60	1.56E-02	8.76E+03	3.27E+03	6.54E+02	0	2.62E+03	70.09%
		70	1.09E-02	7.04E+03	2.27E+03	4.55E+02	0	1.82E+03	74.15%
	Region 2	80	6.27E-03	5.82E+03	1.31E+03	2.62E+02	0	1.05E+03	81.96%
Zn	**Region 3**	90	6.48E-04	1.77E+03	5.06E+02	1.01E+02	0	4.04E+02	77.18%

IMPLEMENTATION

As there are no permitted point source discharges in the French Gulch watershed, the achievement of surface water quality standards will occur through voluntary efforts. Since 2000, the Zonia Mine has voluntarily produced well water from the Clear Springs area effectively reducing loading in French Gulch; however, additional reductions are necessary.

In the second public meeting, availability of 319(h) grant funding for the purpose of implementing watershed restoration plans was introduced. Attendees were informed that applicants requesting 319(h) funding for water quality improvement projects at French Gulch will be given priority. Attendees discussed possible remedial alternatives and the need for stakeholder involvement. Future monitoring activities were also discussed. Cooperation of state and federal agencies and private land owners will be paramount in the implementation activities that support the French Gulch TMDLs.

This TMDL investigation shows reductions for copper and zinc are necessary in the uppermost portion of French Gulch (subwatershed 26); however, there was not enough data to create regional load duration curves for cadmium, copper, or zinc in the uppermost region (above Zonia Mine). It would be ideal to be able to collect a sufficient number of samples and flow measurements to allow for the development of these load duration curves and any of the others that were not developed. ADEQ encourages additional water quality sampling and flow measurement in the French Gulch watershed. The results from such monitoring will contribute to future evaluations of the water quality of French Gulch.

Pursuant to A.R.S. § 49-234J, ADEQ is required to conduct an effectiveness investigation for French Gulch five years after the adoption of the TMDLs. The purpose of this investigation will be to determine if the improvements have been effective and if water quality in French Gulch has improved (i.e. meets water quality standards). Additional

monitoring results collected in the time period between the approval of these TMDLs and the commencement of effectiveness monitoring will be used in the evaluation of best management practice effectiveness. An additional goal would be to collect sufficient credible data to allow for the calculation of allocations and TMDLs for cadmium, copper, and zinc for all of the regions.

PUBLIC PARTICIPATION

Stakeholder participation was encouraged and received throughout the development of this TMDL. Involved parties include BLM, ADEQ, Zonia Mine, local public officials, and citizens. The first public meeting was held in Walnut Grove, Arizona on April 20, 2004 with approximately 30 people in attendance. The second public meeting was also held in Walnut Grove, Arizona on September 14, 2004 with approximately 10 people in attendance. Public notice of the availability of the draft TMDL report was made via a posting in *The Daily Courier*, a newspaper of general circulation on March 18, 2005; via letters; via e-mail notifications; via phone calls; and via web page postings. A 30-day public comment period followed the notice. No comments were received during the 30-day public comment period. After completion of a 45-day review period following this notice in the *Arizona Administrative Register*, the report will be submitted to the EPA for final approval. Responses to questions and comments received during the public notice phase will be submitted to the EPA with the report.

C. TMDLs for Tonto Creek

PROJECT HISTORY

From 1994 through 1996, as a part of an intensive study, ADEQ measured nitrogen levels in upper Tonto Creek and Christopher Creek. This data was sufficient to determine impairment which resulted in the 303[d]-listing, but was insufficient by itself to isolate sources or calculate loads. ADEQ supplemented the historic data by collecting additional data (during 2000, 2002 and 2003) specific to the goals of source quantification and TMDL calculation.

WATERSHED OVERVIEW

Waterbody:	Tonto Creek Watershed
Basin Size:	30 square miles
Designated Uses:	Aquatic & Wildlife, warm water; Fish consumption; Full body contact;
	Aquatic & Wildlife, cold water; Agriculture, irrigation; Agriculture, livestock watering
Communities:	Payson
County:	Gila
Land Ownership:	USFS, AZ Game & Fish, Private
Land Use:	Forest, Recreation
Potential Sources:	Natural, Recreation, Septic Systems, Fish Hatchery

Surface Water Quality Standards

The nitrogen standard is not tied to a particular designated use; the primary intention behind this standard is the prevention of eutrophication in the Roosevelt Lake reservoir at the mouth of Tonto Creek on the Salt River. (ADEQ, 1981)

Total nitrogen concentration is calculated as the sum of nitrite plus nitrate concentration and total Kjeldahl nitrogen concentration in milligrams per liter (mg/l).

The applicable standards are: single sample maximum = 2 milligrams per liter (mg/l); the annual mean standard = 0.5 mg/l. The Arizona Surface Water Quality Standards (A.A.C., R18-11-101 [6]) states, "'Annual mean' means the arithmetic mean of monthly values determined over a consecutive 12-month period, provided that monthly values are determined for at least three months. The monthly value is the arithmetic mean of all values determined in a calendar month."

Exceedences of the annual mean standard have resulted in the listing of Tonto Creek as "Impaired" and are addressed by the TMDL. Tonto Creek had only two single sample exceedences out of 208 samples.

SOURCE IDENTIFICATION, LINKAGE ANALYSIS AND SAMPLE COLLECTION POINTS

The primary objective of this investigation was to collect data sufficient to isolate, geographically and temporally, and quantify the primary pollutant load sources in the project area. All significant sources have been identified and linkages between these significant sources and loads are discussed below.

Other than the Tonto Creek Fish Hatchery (AZPDES Permit No. AZ0021211), there are no known AZPDES-permitted point sources in the subject basin; however, a complete review of all sources may result in the classification of some as point source which would then require AZPDES discharge permits.

In addition to natural background, there are several additional sources including basin-wide recreational uses and unincorporated communities/summer home clusters located in the project area. There is no cattle grazing in the subject basin, nor will it likely occur in the future (e-mail communication from William Barcus, USFS, 5/25/04).

Tonto Creek was monitored from its headwaters to the upstream end of the wilderness area just downstream from Bear Flats. The wilderness area between Bear Flats and Haigler Creek has no previous monitoring data or non-natural sources in its approximately six mile reach. Christopher Creek was monitored at its mouth.

Segments and Sources Linkage

In general, waste from wildlife or humans; e.g., hikers, septic systems, decomposed plant material (including algae) and fertilizers (lawn care, etc.), all can provide inputs to one or more points in the nitrogen cycle. There are no waste water treatment plants in the subject basin, nor is there any cattle grazing. For purposes of this TMDL, ADEQ assigns loads to the segment upstream of the measurement points.

Starting at the Headwaters of Tonto Creek:

Tonto Springs is the perennial source of Tonto Creek and is thus considered natural background. Sample point SRTON073.00 is used to measure the natural background loading. Tonto Creek Fish Hatchery diverts the first 700 gallons per minute from Tonto Springs into its operation – in recent years, this is nearly all the spring discharge.

Discharge from the Tonto Creek Fish Hatchery passes through a pond system designed to reduce nutrient loading. The hatchery is the only AZPDES-permitted point source (Permit No. AZ0021211) in the project area. On the hatchery grounds are several homes (with septic systems) for hatchery employees. Additionally, the area immediately downstream from the hatchery is used for recreation purposes. Sample point SRTON072.66 is used to quantify the impact due to the hatchery and sample point SRTON071.72 quantifies the impacts from the other uses in this segment.

Baptist Camp is a cluster of mostly summer homes approximately 1 1/2 mile downstream from the hatchery. All these homes are on septic systems and are located within 1/4 mile of Tonto Creek. Dick Williams Creek (intermittent or ephemeral) is tributary to Tonto Creek between the hatchery and Baptist Camp. Sample points SRTON070.86, SRTON070.00 and SRTON069.87 are used to quantify the impact due to the Baptist Camp cottage cluster.

Horton Creek (intermittent or ephemeral) is tributary to Tonto Creek approximately one mile below Baptist Camp. There is an USFS day recreation site and campground located at the mouth of Horton Creek. Tonto Creek between Horton Creek and Highway 260 is heavily used for camping, picnicking, and fishing. The USFS had a developed campground at the Tonto Creek junction with Highway 260 approximately one mile below Horton Creek. This campground was closed in 2002 and obliterated in 2003 to make way for the new Highway 260 bridge as part of the highway widening project. The impact due to Horton Creek and the downstream recreation area was measured using sample points SRTON069.83, SRTON069.80, SRTON069.08, SRTON068.95 and SRTON068.77.

Starting at Highway 260 and extending for about 3/4 of a mile downstream is the Kohl's Ranch area, a resort and collection of primarily summer homes. These are all on septic systems and are located within 1/4 mile of Tonto Creek. Butting against the downstream end of Kohl's Ranch is Camp Tontozona, a retreat center and sports training camp run by Arizona State University. Tontozona has less than 3 mile active frontage on Tonto Creek and is also on septic system. Due to their proximity, the impact of nitrogen due solely to camp Tontozona cannot be differentiated from the Kohl's Ranch impact. The Kohl's Ranch impact is quantified using sample point SRTON068.00 and sample points SRTON067.95 and SRTON066.90 quantify the impacts due to both Kohl's Ranch and Camp Tontozona.

About one mile downstream from Tontozona and approximately 100 feet downstream from sample point SRTON066.90 is the mouth of Christopher Creek on Tonto Creek. Sample point SRCRS000.08 is on Christopher Creek at its mouth.

The reach between Christopher Creek and for approximately 1 1/2 mile downstream (to the north end of the Bear Flats community) is quantified using sample points SRTON066.80 and SRTON065.38.

Bear Flats, a cluster of mostly summer homes on septic systems, all within 1/8 mile of Tonto Creek, stretches approximately one mile to the USFS Bear Flat recreation site and its impact is quantified using sample point SRTON064.22.

Data Analysis

For purposes of data analysis and trend determination, ADEQ combined the historic 1994 - 1996 data and the source identification data collected in 2000, 2002 and 2003.

Factors such as weather and varying recreational use levels have an effect great enough to conceal or blur trends; however, several general observations are apparent.

Nitrogen levels stay relatively constant over the summer suggesting accumulation is not an issue.

Nitrogen levels correspond to the level of use along a particular reach; i.e., the hatchery and more popular use areas show a greater impact, but nitrogen levels decrease downstream of these areas.

Nitrogen and discharge were not found to be related.

Critical Conditions

Seasonality is apparent because the stream freezes over for at least a portion of each winter and hatchery production (and its attendant discharge) and recreational visitation is minimal during the "off-season". Therefore, this TMDL applies during the late spring to early fall recreation season and is not necessary during the rest of the year due to the lack of human-caused loading inputs.

Most ADEQ samples were collected at relatively low discharges, but included precipitation-induced higher flows. For the following reasons, ADEQ can only document impairment at discharges less than 100 cfs therefore; this TMDL applies solely to all discharges up to 100 cfs because:

Comparison of nitrogen measurements to discharge does not exhibit a linear relationship, and

ADEQ was only able to measure at discharges up to approximately 100 cfs.

LOAD ALLOCATIONS AND TMDLS

Units Conversion Factor

The need to apply measurements of cubic feet per second and milligrams per liter to determine a load in units of kilograms per year necessitated the determination of a conversion factor. This is calculated through:

$[1.0 \times 10^{-6}\ kg/mg \times 28.316\ l/ft^3 \times 31{,}536{,}000\ sec/year] =$ 892.97

The value 31,536,000 sec/year is based upon a standard year of 365 days and is considered sufficiently accurate for the purpose of calculating this TMDL.

To use: multiply concentration in mg/l by discharge in ft^3/sec then multiply by 892.97 to get the result in kg/year.

TMDL Calculation

The in-stream water quality in the subject waterbody is such that loads need to be reduced in order to meet standards. The TMDLs and associated reductions are set at levels adequate to result in the attainment of applicable water quality standards. A TMDL is the total amount of a pollutant that can be assimilated by the receiving water while still achieving water quality standards. TMDLs can be expressed in terms of mass per time or by other appropriate measures. For purposes of this TMDL, ADEQ has chosen to use kilograms per year (kg/yr) in keeping with the standard which is an annual mean.

The load capacity is the annual mean standard (0.5 mg/l) multiplied by the stream segment discharge and a units conversion factor (892.97) to calculate a load in kilograms per year (kg/year). The TMDL is equal to or less than the load capacity for each segment.

The TMDL is represented by a mathematical equation:

TMDL = WLA + LA + MOS, where:

WLA is the wasteload allocation consisting of loads from point sources. Tonto Creek Fish Hatchery (AZPDE permit no. AZ0021211) is only known point source in the subject basin.

LA is the load allocation consisting of non-point source loads and natural background. The natural background measurements collected at the headwaters of both streams are applied equally to the downstream segments in each stream.

Allocations are assigned as the mean of the measured load from each segment (subtracting the natural background for the WLA) when no exceedence exists. Allocations for segments with exceedences are calculated as detailed in the MOS section.

MOS is a Margin of Safety which serves to address uncertainties in the analysis and the natural system and is detailed below.

Load reductions are calculated as the mean of the measured load minus the WLA minus the LA. The percent reduction is the load reduction divided by the mean of the measured load and is included here to display relative change.

Loads at each sample point include the upstream loads. ADEQ may elect to revisit this TMDL and break out the upstream load from each load when enough data have been collected to allow more accurate accounting for in-stream processes. If this were done, load allocations might be able to be calculated for discrete sources.

Margin of Safety

ADEQ has chosen to allow 5% for the variation in sample analysis and another 5% as a standard error to allow for variation in sampling process (e.g. design, field collection, source identification). Both the sampling process variation amount and the sample analysis variation amount are based upon the Arizona State Laboratory allowance of 5% for each.

This variation may include:

- The lack of characterization of many of the minor sources in the subject basin.
- The potential for unidentified sources to contribute pollutant loads or identified sources to provide larger loads than anticipated.
- Precipitation events can occur in portions of the watershed with other portions receiving none and thereby resulting in runoff patterns and stream discharges different from those observed.

Therefore, the total explicit MOS is 10% and, since it is based upon potential errors in measurement, it applies to the measured load.

A non-quantifiable implicit margin of safety was applied by not allocating additional loading when capacity was available. When the existing load for a stream segment was less than the load capacity, (e.g., standards are not being exceeded) instead of using the difference between load capacity and existing loading as additional allowable load, ADEQ instead chose not to allow any additional loading. This was done for several reasons:

- Even if one or more segments meet standards, the stream reach as a whole does not and therefore additional loading shall not be allocated.
- To allow for non-quantifiable errors in measurement.
- ADEQ assumes conservative mixing and does not account for physical and chemical processes occurring in-stream that may reduce concentrations between sample points.

The MOS is applied by one of two methods:

- If the mean of the measured load plus 10% of the mean of the measured load is less than or equal to the load capacity, the MOS is 10% of the mean of the measured load calculated thusly: mean of the measured concentration multiplied by the discharge multiplied by 892.97 (conversion factor) multiplied by 0.1, or
- If the mean of the measured load plus 10% of the mean of the measured load is greater than the load capacity, the MOS is 10% of the maximum allowable load that will not exceed the load capacity as calculated thusly (For ease of explanation, assume WLA + LA = (W)LA):

TMDL = (W)LA + MOS => (W)LA = TMDL - MOS

The TMDL = 0.5 and MOS = 10% of (W)LA

therefore, (W)LA = 0.5 - 0.1(W)LA => (W)LA + 0.1(W)LA = 0.5 =>

1.1(W)LA = 0.5 => (W)LA = 0.5/0.1 = 0.46.

Therefore, <u>(W)LA = 0.46 Qk</u> = the maximum (W)LA that will result in a TMDL less than or equal to the load capacity. The corresponding MOS is derived:

TMDL = (W)LA + MOS => MOS = TMDL - (W)LA =>

MOS = 0.5 - 0.46 = 0.04 => <u>MOS = 0.04 Qk</u>

Q = discharge, k = units conversion factor of 892.97

<u>TMDL and Allocations</u>

The TMDL is either:

Where the mean of the measured load plus 10% exceeds the load capacity, the TMDL is equal to the load capacity, or

Where the mean of the measured load plus 10% does not exceed the load capacity, the TMDL is equal to the sum of the measured load and the MOS. This is the application of the non-quantifiable portion of the MOS explained previously.

The discharge and measured data used to calculate loads and reductions was calculated by taking the arithmetic mean (where more than one year of annual means was calculable) of the annual arithmetic means of the monthly arithmetic means of both the discharge and measured nitrogen concentrations for each segment of the stream. In the instances (4 out of 208 samples) where the laboratory reported a non-detect for both total nitrogen as nitrite and nitrate and total Kjedahl nitrogen, one half of the reporting limit was used as the concentration value for calculating the TMDL and related loads (per A.A.C. R18-11-603[1]).

The natural background measurements collected at the headwaters of both streams are applied to the downstream segments.

The WLA and LA (in kg/year) are calculated as follows:

Where the mean of the measured load plus 10% exceeds the load capacity, the WLA is equal to 0.46 multiplied by discharge multiplied by 892.97 and then the natural background is subtracted out. (Similarly, the LA is equal to 0.46 multiplied by discharge multiplied by 892.97), or

Where the mean of the measured load plus 10% is equal to or less than the load capacity, the WLA is equal to the mean of the measured load minus natural background and the LA is equal to the mean of the measured load.

Load reductions are calculated as the mean of the measured load minus the WLA minus the LA. The percent reduction is the load reduction divided by the mean of the measured load and is included here to display relative change.

Table 1 displays the TMDLs, allocations, reductions and supporting data. All loads, reductions and the TMDL are loads in units of kg/year. These TMDLs, allocations and reductions apply to all flows from the third week of May through the second week of September.

Waste Load Allocations and Load Allocations must be met by all of the identified sources in order for the stream to meet the TMDL. The point(s) of compliance are the sample points used in this study unless or until a means of differentiating between clustered sources is devised.

Table 1. TMDL and Related Loads for Total Nitrogen Annual Mean

Based upon Annual Mean Standard of 0.5 mg/l. Units are kg/year and displayed as rounded to nearest whole number unless otherwise indicated.

Natural background load = 72 kg/year and is the nitrogen measured at the natural background site and applied to all other sites.

Segment - sources - sites[1]	Measured Load[2]	MOS[3]	WLA[4]	LA[4]	**TMDL[5]**	Load Reduction[6] (kg/year)	Load Reduction[7] (%)
Natural Background - spring Site: 73.00	72	7		72	**79**	0	0%
Fish Hatchery Sites: 72.66, 71.72	934	71	742	72	**884**	120	13%
Baptist Camp - septic & recreation Sites: 70.86, 70.00, 69.87	499	50		499	**549**	0	0%
Below Horton Creek - recreation Sites: 69.83, 69.80, 68.95, 68.77	309	31		309	**340**	0	0%
Kohl's Ranch & Tontozona - septic & recreation Site: 66.90	450	45		450	**495**	0	0%
Christopher Creek mouth - recreation Site: 0.08[8]	492	49		492			
Below Christopher - recreation Sites: 66.80, 65.38	2081	128		1475	**1603**	606	29%
Bear Flats - septic & recreation Site: 64.22	1945	143		1639	**1781**	306	16%

1) All segments include natural background. Recreational use includes hiking, biking, camping, picnicking, wading, fishing and hunting.
2) Arithmetic mean of annual arithmetic means for each segment. Load = discharge x concentration x 892.97
3) If load + 10% > load capacity, then: MOS = 0.04 x 892.97 x discharge, else: MOS = mean of measured concentration x 0.1 x discharge x 892.97. (see MOS section of report for detailed explanation.)
4) If the load + MOS > load capacity, then: WLA = 0.46 x discharge x 892.97 - natural background, else: WLA = mean of measured load - natural background. Likewise, if the load + MOS > load capacity, then: LA = 0.46 x discharge x 892.97, else: LA = mean of measured load. For the Fish Hatchery segment, the entire LA is natural background.
5) If mean of measured load + MOS exceeds load capacity, then: TMDL = Load capacity for segments, else: the TMDL = mean of measured load + MOS.
6) Load Reduction (kg/year) = Mean of measured load - WLA - LA.
7) Load Reduction (%) = Load Reduction divided by mean of measured load.
8) Christopher Creek mouth site included as a load source. A TMDL was not calculated for Christopher Creek; however, the TMDLs assigned to the two segments downstream of Christopher Creek assume the loading from Christopher Creek will not increase.

IMPLEMENTATION

This investigation shows that water quality standards will be met when the load reductions are achieved. Identification of major sources of pollutant loading and quantification of contributions will allow management decisions to be made.

Targets for Tonto Creek should include the inspection and repair or upgrade as necessary of all septic and waste systems in the basin. The USFS has, in the last few years, added or upgraded toilets with vault units. The USFS may wish to determine usage statistics for the various recreation areas and design a system for controlling human impacts; e.g., installing more vault toilets, establishing hours of use, daily monitoring of bacteria levels, restrictions based upon discharge, etc.

ADEQ will work with the Arizona Game and Fish Department in determining new permit limits for the Tonto Creek Fish Hatchery and the means of achieving them. Under current Licensing Time Frame requirements, the new permit is due for completion by May 31, 2005.

The U.S. Forest Service (Tonto National Forest) and the Gila County Health Department may wish to establish regular monitoring of total nitrogen levels for the reaches most likely to show a problem in the future. Gila County has recently been awarded a grant which they intend to apply towards addressing septic systems in the subject watershed.

Monitoring should be planned to allow collection of sufficient samples to determine compliance with both the single sample maximum and annual mean standards. The use of tracers; e.g., fluorescent dyes, may be useful if a means of differentiating between tightly clustered sources such as septic systems can be devised. Future studies may also include collection of the data necessary to permit the use of fate and transport modeling.

PUBLIC PARTICIPATION

Development of the Tonto Creek TMDL included public participation in accordance with 40 CFR Parts 25 & 130.7. Public participation included review and input from stakeholder groups. Notice regarding the availability of the draft TMDL report was posted in *The Payson Roundup and Advisor* on February 17, 2005 and a 30-day public comment period followed. On February 22, 2005, a project presentation meeting was held by the ADEQ. Property owners, environmental groups, representatives of local, state, and federal agencies, and other interested members of the public were notified and invited to attend the meeting. A copy of the report was made available at the meeting.

In response to a recommendation by the AZG&F, ADEQ re-calculated the loads and allocations using additional water quality results for the "Natural Background" segment. The TMDL report was re-drafted to include the re-calculated loads and allocations and was subsequently re-noticed in *The Payson Roundup & Advisor* on March 18, 2005. The draft TMDL report can be found on the ADEQ TMDL web site at http://www.adeq.state.az.us/environ/water/assess/tmdl.html

Written documentation of public participation will be on file with ADEQ's Hydrologic Support and Assessment Section, located at 1110 W. Washington Street, 5th Floor, Phoenix, Arizona 85007.

4. The following comments were received from the AZG&F March 15, 2005.

Some of the comments were shortened for this notice; however, the original intent was preserved.

AZG&F: We feel that as written the TMDL will have a severe detrimental and unnecessary impact to Tonto Creek Hatchery (TCH) operations and subsequently the coldwater fisheries program in Arizona. We believe that the information presented in the TMDL proposal does not support nor justify any reduction in the wasteload allocation for upper Tonto Creek.

ADEQ: The ultimate impact of the Tonto Creek nitrogen TMDLs to the TCH is not yet known. A watershed based implementation plan that will establish a strategy for nitrogen load reductions in Tonto Creek from the headwaters to Haigler Creek will be developed in conjunction with the stakeholders, including the AZG&F. To this end, ADEQ and AZG&F are actively meeting to discuss implementation alternatives.

Measurements of the nitrogen load in Tonto Creek during the TMDL investigation confirm load reductions are necessary in the "Fish Hatchery" segment for Tonto Creek to meet the annual mean nitrogen standard for Tonto Creek. The TMDL table shows the mean of measured concentration in this segment is 0.528 which is 0.028 above the standard.

AZG&F: Specifically the proposal states that Tonto Creek had only two single sample (2.0 mg/L) exceedences, for total nitrogen, out of 208 samples and that the exceedences of the annual mean standard (0.50 mg/L) have resulted in the listing of Tonto Creek as "Impaired" and is addressed by the TMDL…. The report also states that "The standard is not tied to any particular designated use; the primary intention behind this standard is the prevention of eutrophication in the Roosevelt Lake reservoir at the mouth of Tonto Creek on the Salt River." The proposal further states, "Reliable in-stream indicators related to nitrogen impacts on water quality have not been observed in the subject watershed." These indicators include vegetation, (algae and macrophytes), vertebrate and fish communities. Why has a TMDL been conducted on a water body that the designated uses are fully supported?

ADEQ: The nitrogen water quality standard for Tonto Creek can be found in the *Arizona Administrative Code* R18-11-109. The standard protects the designated uses of Roosevelt Lake reservoir and the nitrogen concentration (annual mean or single sample maximum) must be met to ensure these designated uses will be met. Exceedences of the annual mean nitrogen standard is evidence designated uses are not being protected. Changes to the nitrogen standard

for Tonto Creek would need to be addressed through the Triennial Review (of Water Quality Standards) process which has just begun.

In-stream indicators are signs or signals that might also demonstrate impairment. A lack of observed in-stream indicators does not mean the stream meets standards. The annual mean nitrogen concentration is above the standard in Tonto Creek; the designated uses are not being fully supported.

AZG&F: In the report ADEQ assumes conservative mixing and does not account for physical and chemical processes occurring in-stream that may reduce concentrations between sample points. Isn't chemical processes occurring in-stream that reduce concentrations between sample points assimilative capacity and the basic premise of a TMDL?

ADEQ: In-stream chemical processes can have an effect on concentrations, but those processes result in the concentrations ADEQ measured at downstream points. Therefore, assimilative capacity has been inherently addressed by using actual measurements.

AZG&F: The TMDL is being conducted on a numeric standard that has been set in place to protect a waterbody that is 70 miles away. The TMDL must focus on the lower portion of Tonto Creek and address the assimilative capacity of the system as it enters Roosevelt Lake and the potential effect on the reservoir itself.

ADEQ: The only segment of Tonto Creek that was listed as impaired, hence the focus of this investigation, was the uppermost segment of Tonto Creek. Concern regarding the nitrogen standard set for Tonto Creek should be addressed through the Triennial Review (of Water Quality Standards) process which has just begun.

AZG&F: The TMDL has indicated that nitrogen and discharge were not found to be related. This is not surprising when dealing with such low levels of total nitrogen, a fraction of a part per million is of little consequence.

ADEQ: A relationship between discharge and concentration was not found in Tonto Creek using the measured concentrations and discharges taken during the time period of the investigation. The time period of the investigation spanned a drought and moderate and high flows were not sampled. The implementation plan will contain a recommendation for measuring nitrogen concentrations at moderate and high flows to aid in future assessment of the protection of the nitrogen standard at these flows.

The level of nitrogen may seem low as the concentration is analyzed and reported at a part per million (mg/L) level, however, the standard is set at 0.5 mg/L and the concentrations found in Tonto Creek at several localities exceeded this standard. Concern regarding the nitrogen standard set for Tonto Creek should be addressed through the Triennial Review (of Water Quality Standards) process which has just begun.

AZG&F: Variability in low levels of nitrogen in surface water probably can be attributed to both wet and dry atmospheric deposition. In the 1998 guidance for developing 303[d] lists EPA clarifies that states should list all waters impaired either entirely or partially due to pollutants from atmospheric deposition. Recent analysis of snow from the Tonto Creek and Canyon Creek watersheds illustrates just what levels of nitrogen that the TMDL is attempting to address. One snow sample was collected from the Tonto watershed on December 8, 2004 with a total nitrogen content of 0.49 mg/L. Three samples were collected from the Canyon watershed from three different snow events on March 23, 2004, December 8, 2004 and January 28, 2005 with a total nitrogen concentration of 0.66, 0.59 and 0.51 mg/L respectively. At these low levels a major non-point source of nitrogen to the watershed is atmospheric deposition and therefore must be addressed in the TMDL.

ADEQ: The use of snowmelt data raises numerous questions, including what percentage of nitrogen from rainfall makes it into the stream and how does this affect a TMDL set for the summer recreation period. Nitrogen samples were collected at a "background site" at the headwaters of Tonto Creek to determine the background level of nitrogen. In a watershed as small as Tonto Creek, it is assumed that the background level of nitrogen due to atmospheric causes is consistent throughout the watershed. Samples at the background site did not exceed the annual mean standard, nor did samples taken at the sites in between the "Fish Hatchery" segment and the "Below Christopher" segment, which would suggest that atmospheric deposition is not the cause of the exceedences seen just downstream of the TCH.

ADEQ collected samples from precipitation runoff-induced flows from at least three storm events during 2003. These measurements inherently include any atmospheric deposition effects on the stream. The only stream segment to fail to meet standards in 2003 was the segment immediately downstream of the TCH, which suggests that atmospheric deposition is not the source of the exceedences measured in Tonto Creek. Thus, the changes in concentration immediately downstream from TCH, are due to sources greater than the noise; i.e., TCH.

AZG&F: The TMDL study was completed during the calendar year 1999 to 2003 with field activities being conducted during the months of May to October. This period was during the hottest and driest years of a drought to occur in Arizona in the last 100 years. Annual means for determining loading (chemical) for stream systems can be determined if two samples in a month for any three months. The average annual means were established for Tonto Creek for this study during the months of May to October (50% of the year). This period just happens to represent the driest months of any annual cycle in addition to occurring during a historic drought. This period also coincides with summer vacations and family activities. Considering the timing of the study there is a high probability that the results are biased and do not reflect a true annual average.

ADEQ: Field activities targeted the summer recreation period, the critical condition, because of the likely relationship between increased recreation in and along Tonto Creek and increased nitrogen loading. Sampling does confirm this relationship. Results show May through July as having the highest nitrogen concentrations. The Water Quality

Standards do not require annual mean samples to represent any particular season, but the huge reduction of human activity (including hatchery production) in the watershed during the winter months would not make this a practical time to apply the TMDL; therefore, ADEQ limited the TMDL to the season of greatest recreation impact.

ADEQ concurs that this investigation spanned a drought. The implementation plan will contain a recommendation for measuring nitrogen concentrations at moderate and high flows to aid in future assessment of the protection of the nitrogen standard at these flows.

5. The time during which the agency will accept written comments and the time and place where oral comments may be made:

There is no public comment period associated with this notice; the Department previously provided an opportunity for comment on the proposed TMDLs.

6. The name and address of agency personnel with whom persons may communicate regarding the public information:

Name:	C. Nancy La Mascus
Address:	Arizona Department of Environmental Quality 1110 W. Washington Phoenix, AZ 85007
Telephone:	(602) 771-4468 (in Arizona: 1-800-234-5677; ask for four-digit extension)
E-mail:	lamascus.nancy@azdeq.gov

Copies of the revised draft TMDL may be obtained from the Department by contacting the numbers above. The revised draft TMDL may also be downloaded from the Department's web site at: http://www.adeq.state.az.us/environ/water/assessment/status.html

NOTICE OF PUBLIC INFORMATION

DEPARTMENT OF ENVIRONMENTAL QUALITY

[M05-111]

1. A.R.S. Title and its heading: 49, The Environment
A.R.S. Chapter and its heading: 2, Water Quality Control
A.R.S. Article and its heading: 6, Pesticide Contamination Prevention

2. The public information relating to the listed statute:

According to A.R.S. § 49-305, the Arizona Department of Environmental Quality (Department or ADEQ) is required to establish a groundwater protection list (GWPL or List) of those pesticides that have the potential to pollute groundwater. The director shall immediately place all pesticides identified under A.R.S. § 49-303(C)(2) and (3) on the List and regulate the use of these pesticides if the pesticide is intended for application to or injection into the soil by ground based application equipment or chemigation, or if the application site will be flood or furrow irrigated within 72 hours of application of the pesticide based on label recommendations.

In 2004, the statute was modified to eliminate the requirement that the GWPL be adopted each year by rule. The Department is currently promulgating a rulemaking for which a public hearing is scheduled on May 1, 2005, to implement this statutory requirement change. The rulemaking, among other changes, outlines the process for: 1) developing the annual GWPL, 2) publishing it in the *Arizona Administrative Register* for comment, and 3) publishing the final GWPL on or before July 1st of each year. The oral proceeding before the Governor's Regulatory Review Council (GRRC) will be in June or July 2005 and the rules will become effective 60 days following approval by the G.R.R.C.

3. Groundwater Protection List

Developing the Groundwater Protection List

Prior to the statutory changes in 2004 when the GWPL was adopted through a rulemaking, adding or deleting an active ingredient to or from the GWPL was resource intensive and not practical in terms of making a complete and accurate list available to stakeholders in a timely manner. In ADEQ's current proposed rulemaking, the Department has established a process to develop and maintain the GWPL and includes an opportunity for the public to review and comment on those active ingredients placed on or removed from the GWPL.

The new process requires the Department to develop the draft GWPL early in the year based on the pesticide active ingredients registered by the Arizona Department of Agriculture in the previous calendar year. Once developed, the Department will publish the draft GWPL in the *Arizona Administrative Register.* With publication, a 30-day public review and written comment period begins. After completion of the 30-day review period, the Department will formulate a response to those comments and make any necessary modifications to the GWPL. The final GWPL will be published in the *Arizona Administrative Register* on or before July 1st and will include a summary of the comments received and the Department's response to those comments. The new GWPL will not become effective until December 1st of the publication year.

Crop production is a year-round industry in Arizona, but summer and fall are especially important seasons for preparation, planning, and harvesting of crops. Both the chemical industry and the growers need sufficient time to respond to the new GWPL, in terms of crops being grown, products available for use, and whether specific best management practices may be needed. When the Department publishes the GWPL in mid-summer, many growers are well into their preparation for summer, fall and winter plantings and could be severely impacted by a GWPL becoming effective in the middle of their planning cycle. Therefore, the final GWPL will be published on or before July 1st and will become effective on December 1st, which coincides with the Department's requirement to report the GWPL to the Legislature.

This Notice of Public Information is a courtesy notice based on the Department's current rulemaking, which as mentioned above, will be heard by the G.R.R.C. in June or July. The Department will publish the final 2005 GWPL after the rules have been formally approved by the G.R.R.C. Once approved, the final GWPL will be placed on the Department's website.

2005 Groundwater Protection List

When the Pesticide Contamination Prevention rules were first adopted in 1992, there were 152 active ingredients placed on the GWPL. Each year since 1992, the Department has drafted a new GWPL but none of these were ever adopted into rule. For this reason the 2005 GWPL will contain 224 active ingredients – the original 152 plus any registered active ingredient since 1992 that met the listing criteria based on the specific numeric values in A.A.C. R18-6-103. The proposed rules provide several mechanisms that could result in an active ingredient being removed from the GWPL including: 1) cancellation of registration; or 2) that monitoring results by the Department have established that the active ingredient has not been detected in Arizona groundwater. The draft GWPL denotes those active ingredients that the Department believes will be removed based on these two factors. It would reduce the overall list from 224 active ingredients to 87. Once the rules are adopted, the final GWPL will reflect active ingredients removed based on these factors. Conversely, once an active ingredient has been found in Arizona soil or groundwater, it cannot be removed from the GWPL. The draft GWPL also denotes those active ingredients that have been detected in Arizona soil or groundwater as a result of agricultural use.

The rules also establish a new alternative assessment process, other than the specific numeric values to determine an active ingredient's potential to pollute groundwater. This new assessment process is found at A.A.C. R18-6-102(C) and R18-6-103(2). Active ingredients may be removed in the future based on a change in the specific numeric values or based on the results of the new assessment evaluation. As the rules are not yet final, registrants of chemicals in 2004 did not have the opportunity to use the new assessment evaluation process nor have changes been proposed to the specific numeric values. The Department is not able to estimate how many active ingredients might be removed in the future based on these two factors. The final GWPL is not likely to reflect any removals based on these factors as there will not be enough time for the Department to review submittals under the new evaluation process before the final list needs to be published to allow both industry and growers time to implement the list.

Draft 2005 Groundwater Protection List

Bold = detected in GW / soil in Arizona

• = Likely to drop off GWPL based on provisions in new rules

	CAS Number	Chemical Name
•	542-75-6	1,3-Dichloropropene
	1928-43-4	**2,4-D 2-Ethylhexyl Ester**
	94-75-7	**2,4-D Acid**
		2,4-D Alkanol*Amine Salts of Ethanol and Isopropanol
	137335-70-7	**2,4-D Alkyl*Amine *(as in tall oil fatty acids)**
	1929-73-3	**2,4-D Butoxyethyl Ester**
	94-80-4	**2,4-D Butyl Ester**
	2212-54-6	**2,4-D DDA (Dodecyclamine Salt)**
	5742-19-8	**2,4-D Diethanolamine Salt**
	20940-37-8	**2,4-D Diethylamine Salt**
	2008-39-1	**2,4-D Dimethylamine Salt**
	533-23-3	**2,4-D Ethylhexyl Ester**

	1713-15-1	**2,4-D Isobutyl Ester**
	53404-37-8	**2,4-D Isooctyl (2-ethyl-4-methylpentyl)**
	5742-17-6	**2,4-D Isopropylamine Salt**
	25168-26-7	**2,4-D Isooctyl Ester**
	94-11-1	**2,4-D Isopropyl Ester of**
	2212-59-1	**2,4-D N-Oleyl-1,3-Propylenediamine Salt**
	28685-18-9	**2,4-D TDA (Tetradecyclamine)**
	2646-78-8	**2,4-D Triethylamine Salt**
	32341-80-3	**2,4-D Triisopropanolamine Salt**
•	32357-46-3	2,4-DB, Butoxyethyl Ester
•	2758-42-1	2,4-DB, DMA Salt
	16165-67-0	2,4-DP-P
•	30560-19-1	Acephate
	135410-20-7	Acetamiprid
	135158-54-2	Acibenzolar-S-Methyl
•	107-02-8	Acrolein
•	15972-60-8	Alachlor
•	116-06-3	Aldicarb
•	834-12-8	Ametryn
•	61-82-5	Amitrole
•	7778-39-4	Arsenic Acid
•	2302-17-2	Asulam, Sodium Salt
	1912-24-9	**Atrazine**
•	86-50-0	Azinphos-Methyl
	131860-33-8	Azoxystrobin
•	22781-23-3	Bendiocarb
•	17804-35-2	Benomyl
	314-40-9	**Bromacil**
	53404-19-6	**Bromacil, Lithum Salt**
•	2008-41-5	Butylate
•	75-60-5	Cacodylic Acid (Dimethylarsinic Acid)
•	124-65-2	Cacodylic Acid, Sodium Salt
•	133-06-2	Captan
	63-25-2	**Carbaryl**
•	1563-66-2	Carbofuran
•	5234-68-4	Carboxin
	128639-02-1	Carfentrazone-Ethyl

	76-06-2	Chloropicrin
•	1897-45-6	Chlorothalonil
•	64902-72-3	Chlorsulfuron
	99129-21-2	Clethodim
	1702-17-6	Clopyralid
•	16828-95-8	Copper Ammonia Complex
•	33113-08-5	Copper Ammonium Carbonate
•	12069-69-1	Copper Carbonate
•	14215-52-2	Copper Ethanolamine Complex
•	13426-91-0	Copper Ethylenediamine
•	9007-39-0	Copper Salts of Fatty & Rosin Acids
•	1344-73-6	Copper Sulfate, Basic
•	1332-14-5	Copper Sulfate, Basic (2+)
•	82027-59-6	Copper Triethanolamine Complex
•	20427-59-2	Copper Hydroxide
•	7758-99-8	Copper Sulfate
	420-04-2	Cyanamide
•	21725-46-2	Cyanazine
•	1134-23-2	Cycloate
•	66215-27-8	Cyromazine
	52918-63-5	Deltamethrin
	13684-56-5	Desmedipham
•	333-41-5	Diazinon
	1918-00-9	**Dicamba**
	25059-78-3	**Dicamba, DEA Salt**
	104040-79-1	**Dicamba, DGA Salt**
	2300-66-5	**Dicamba, DMA Salt**
	10007-85-9	**Dicamba, Potassium Salt**
	1982-69-0	**Dicamba, Sodium Salt**
•	1194-65-6	Dichlobenil
•	99-30-9	Dicloran
•	38727-55-8	Diethathyl Ethyl
•	43222-48-6	Difenzoquat Methyl Sulfate
	109293-97-2	Diflufenzopyr
•	60-51-5	Dimethoate
	110488-70-5	Dimethomorph
	165252-70-0	Dinotefuran

•	957-51-7	Diphenamid
•	85-00-7	Diquat Dibromide
	330-54-1	**Diuron**
•	79277-27-3	DPX-M6316
	144-21-8	DSMA (Disodium Methanearsonate)
	137512-74-4	Emamectin Benzoate
	115-29-7	**Endosulfan**
•	145-73-3	Endothall
•	2164-07-0	Endothall, Dipotassium Salt of
•	129-67-9	Endothall, Disodium Salt of
•	759-94-4	EPTC
•	16672-87-0	Ethephon
•	26225-79-6	Ethofumesate
•	13194-48-4	Ethoprop
•	56-38-2	Ethyl Parathion
•	2593-15-9	Etridiazole
•	22224-92-6	Fenamiphos
•	60168-88-9	Fenarimol
•	69806-50-4	Fluazifop-Butyl
•	79241-46-6	Fluazifop-P or R -Butyl
•	70124-77-5	Flucythrinate
	142459-58-3	Flufenacet (Thiafluamide)
•	2164-17-2	Fluometuron
•	59756-60-4	Fluridone
	66332-96-5	Flutolanil
	102851-06-9	Fluvalinate
•	25954-13-6	Fosamine Ammonium
•	39148-24-8	Fosetyl-Al
	77182-82-2	Glufosinate-Ammonium
•	1071-83-6	Glyphosate (Group)
•	114370-14-8	Glyphosate Ammonium Salt
•	38641-94-0	Glyphosate, Isopropylamine Salt
•	70901-12-1	Glyphosate, Potassium Salt
	112226-61-6	Halofenozide
	100784-20-1	Halosulfuron-Methyl
•	51235-04-2	Hexazinone
•	35554-44-0	Imazalil

	114311-32-9	Imazamox
•	81405-85-8	Imazamethabenz-Methyl (Meta)
•	81405-85-8	Imazamethabenz-Methyl (Para)
	104098-48-8	Imazapic
•	81335-37-7	Imazaquin
	81335-77-5	Imazethapyr
	101917-66-2	Imazethapyr, Ammonium Salt
	138261-41-3	Imidacloprid
•	42509-80-8	Isazophos
	143390-89-0	Kresoxim Methyl
•	58-89-9	Lindane
	330-55-2	**Linuron**
	128-58-3	MAA (Methanearsonic Acid)
•	121-75-5	Malathion
•	28282-15-2	Maleic Hydrazide, Potassium Salt
	12427-38-2	Maneb
•	94-74-6	MCPA
•	2039-46-5	MCPA, DMA Salt
•	29450-45-1	MCPA, 2 Ethylhexyl Ester
•	26544-20-7	MCPA, Isooctyl Ester
•	3653-48-3	MCPA, Sodium Salt
	16484-77-8	Mecoprop-P (MCPP-P)
	70630-17-0	Mefenoxam
•	24307-26-4	Mepiquat Chloride
•	245735-90-4	Mepiquat Pentaborate
	208465-21-8	Mesosulfuron-Methyl
•	57837-19-1	Metalaxyl
•	108-62-3	Metaldehyde
•	137-41-7	Metam-K (Potassium)
•	137-42-8	Metam-Na (Sodium)
•	10265-92-6	Methamidophos
•	2032-65-7	Methiocarb
	16752-77-5	**Methomyl**
	161050-58-4	Methoxyfenozide
•	298-00-0	Methyl Parathion
•	51218-45-2	Metolachlor
•	87392-12-9	Metolachlor - S

	21087-64-9	**Metribuzin**
•	74223-64-6	Metsulfuron Methyl
•	7786-34-7	Mevinphos
•	6923-22-4	Monocrotophos
	2163-80-6	Monosodium Methanearsonate (MSMA)
•	88671-89-0	Myclobutanil
•	15299-99-7	Napropamide
	111991-09-04	Nicosulfuron
•	27314-13-2	Norflurazon
•	19044-88-3	Oryzalin
	23135-22-0	**Oxamyl**
•	301-12-2	Oxydemeton-Methyl
•	4685-14-7	Paraquat
•	1910-42-5	Paraquat Dichloride
•	1114-71-2	Pebulate
•	732-11-6	Phosmet
•	13171-21-6	Phosphamidon
•	1918-02-1	Picloram
•	26952-20-5	Picloram, Isooctyl Ester of
•	2545-60-0	Picloram, Potassium Salt
•	6753-47-5	Picloram, Triisopropanolamine Salt
•	51-03-6	Piperonyl Butoxide
•	41198-08-7	Profenofos
	1610-78-0	**Prometon**
	7287-19-6	**Prometryn**
•	23950-58-5	Pronamide
•	25606-41-1	Propamocarb
•	60207-90-1	Propiconazole
	94125-34-5	Prosulfuron
	123312-89-0	Pymetrozine
	129630-19-9	Pyraflufen-Ethyl
•	1698-60-8	Pyrazon (Chlordiazon)
	123343-16-8	Pyrithiobac Sodium
	84087-01-4	Quinclorac
•	74051-80-2	Sethoxydim
•	122-34-9	Simazine
•	50723-80-3	Sodium Bentazon

•	7775-09-9	Sodium Chlorate
•	74222-97-2	Sulfometuron-Methyl
	81591-81-3	Sulfosate
•	35400-43-2	Sulprofos
	112410-23-8	Tebufenozide
•	34014-18-1	Tebuthiuron
•	5902-51-2	Terbacil
•	13071-79-9	Terbufos
•	886-50-0	Terbutryn
	111988-49-9	Thiacloprid
	153719-23-4	Thiamethoxam
	117718-60-2	Thiazopyr
•	51707-55-2	Thidiazuron
•	59669-26-0	Thiodicarb
•	23564-05-8	Thiophanate-Methyl
•	137-26-8	Thiram
	87820-88-0	Tralkoxydim
•	43121-43-3	Triadimefon
•	52-68-6	Trichlorfon
•	55335-06-3	Triclopyr
•	64700-56-7	Triclopyr, Butoxyethyl Ester
•	57213-69-1	Triclopyr, Triethylamine Salt
	199119-58-9	Trifloxysulfuron-Sodium
•	26644-46-2	Triforine
	95266-40-3	Trinexapac-Ethyl
•	1929-77-7	Vernolate
•	50471-44-8	Vinclozolin

4. Name and address of agency personnel with whom persons may communicate:

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The proposed Groundwater Protection List can be downloaded from the Department website at: http://www.azdeq.gov/environ/water/assessment/pesticide.html

5. The time during which the agency will accept written comments and the time and place where oral comments may be made:

The Department will accept written comments on the draft Groundwater Protection List for 30 days following publication of this Notice. There is no public hearing associated with establishment of the GWPL. After the proposed rulemaking is approved by the Governor's Regulator Review Council the Department will publish the final GWPL in the *Arizona Administrative Register.*